IN THE CLAIMS

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

Claims 1-52 (canceled).

53. (previously presented) A method of synthesizing an interframe predicted image of a current frame from a reference image for encoding/decoding image information to produce motion vectors, comprising:

a first step for calculating values of motion vectors between said interframe predicted image and said reference image for four representative points at coordinates (i,j), (i+p, j), (i, j+q), (i+p, j+q) of said interframe predicted image (where i, j, p, q are integers, the horizontal and vertical components of the motion vectors of the representative points taking the values of integral multiples of 1/k where k is the hk power of 2, and hk is a non-negative integer),

a second step for calculating a motion vector of a pixel in said interframe predicted image at coordinates (x+w, y+w) by performing bilinear interpolation/extrapolation on the motion vectors of the four representative points of the interframe predicted image where the pixel sampling interval in both horizontal and vertical directions is 1 and horizontal and vertical coordinates of sampling points are obtained by adding w to integers (where w=wn/wd, wn is a non-negative integer, wd is a hw power of 2, hw is a non-negative integer and wn<wd), where said second step comprises:

a third step for calculating the horizontal and vertical components of motion vector at the coordinates (i, y+w) as numerical values which are

respectively integral multiples of 1/z (where z is the power of 2, and hz is a non-negative integer) by linear interpolation/extrapolation of the motion vectors of the representative points at the coordinates (i, j), (i, j+q), and for calculating the horizontal and vertical components of the motion vector at the coordinates (i+p, y+w) as values which are respectively integral multiples of 1/z (where z is the hz power of 2, and hz is a non-negative integer) by linear interpolation/extrapolation of the motion vectors of the representative points at coordinates (i+p, j), (i+p, j+q), and

a fourth step for calculating the horizontal and vertical components of the motion vector of the pixel at the coordinates (x+w, y+w) as values which are respectively integral multiples of 1/m (where m is the hm power of 2, and hm is a non-negative integer) found by linear interpolation/extrapolation of two motion vectors at coordinates (i, y+w), (i+p, y+w); and

a fifth step of synthesizing said interframe predicted image by calculating the pixel value of said pixel at coordinates (x+w, y+w) in said interframe predicted image using said reference image and said motion vector of said pixel at coordinates (x+w, y+w) calculated in said fourth step.

54. (currently amended)A method of synthesizing an interframe predicted image of a current frame from a reference image for encoding/decoding image information to produce motion vectors, comprising: a first step for calculating values of motion vectors between said interframe predicted image and said reference image for four representative points at coordinates (i,j), (i+p, j), (i, j+q) (i+p, j+q) of said interframe predicted image (where i, j, p, q are integers, the horizontal and vertical components of the

motion vectors of the representatives points taking the values of integral multiples of 1/k where k is the hk of power 2, and hk is a non-negative integer),

a second step for calculating a motion vector of a pixel in said interframe predicted image at coordinates (x+w, y+w) by performing bilinear interpolation/extrapolation on the motion vectors of four representative points of the interframe predicted image where the pixel sampling interval in both horizontal and vertical directions is 1 and horizontal and vertical coordinates of sampling points are obtained by adding w to integers (where w=wn/wd, wn is a non-negative integer, wd is a hw power of 2, hw is a non-negative integer and wn<wd), where the second step comprises:

a third step for calculating the horizontal and vertical components of motion vector at the coordinates (x+w, j) as numerical values which are respectively integral multiples of 1/z (where z is the hz power of 2, and hz is a non-negative integer) by linear interpolation/extrapolation of the motion vectors of the representative points at the coordinates (i, j), (i+p, j), and for calculating the horizontal and vertical components of the motion vector at the coordinates (x+w, j+q) as values which are respectively integral multiples of 1/z (where z is the hz power of 2, and hz is a non-negative integer) by linear interpolation/extrapolation of the motion vectors of the representative points at coordinates (i, j+q), (i+p, j+q), and

a fourth step for calculating the horizontal and vertical components of the motion vector of the pixel at the coordinates (x+w, y+w) as values which are respectively integral multiples of 1/m (where m is the hm of power 2, and

hm is a non-negative integer), found by linear interpolation/extrapolation of two motion vectors at the coordinates (x+w, j), (x+w, j+q); and

a fifth step of synthesizing said interframe predicted image by calculating the pixel value of said pixel at coordinates (x+w, y+w) in said interframe predicted image using said reference image and said motion vector of said pixel at coordinates (x+w, y+w) calculated in said fourth step.

55. (previously presented) A method of synthesizing an interframe prediction image according to Claim 53, wherein, when the motion vector of a pixel at the coordinates (x+w, y+w) are found using (u0, v0), (u1, v1), (u2, v2), (u3, v3), which are the horizontal and vertical components of the motion vectors of the representative points at coordinates (i,j), (i+p, j), (i, j+q), (i+p, j+q) multiplied by k, (uL(y+w), vL(y+w)) which are the horizontal and vertical components of the motion vector at a point having coordinates (i, y+w) multiplied by z, are found by calculating:

$$uL\ (y+w) = (\ (\ (q\cdot wd - (y-j)\cdot wd-$$

$$wn)\ u0 + ((y-j)\cdot wd + wn)\ u2)z)////(q\cdot k\cdot wd),$$

$$vL(y+w)=(((q\cdot wd-(y-j)\cdot wd-$$

$$wn)\ v0+((y-j)\cdot wd+wn)\ v2)\ z)////(q\cdot k\cdot wd)$$

(where //// is a division wherein the computation result is rounded to the nearest integer when the result of an ordinary division is not an integer, and the order of computational priority is equivalent to multiplication and division),

(uR(y+w), vR(y+w)) which are the horizontal and vertical components of the motion vector at a point having the coordinates (i+p, y+w) multiplied by z, are found by calculating:

$$uR(y+w)=(((q\cdot wd-(y-j)\cdot wd-wn)\,u1+((y-j)\cdot wd+wn)\,u3)\,z)\,////\,(q\cdot k\cdot wd)$$

$$vR(y+w)=(((q\cdot wd-(y-j)\cdot wd-wn)\,v1+((y-j)\cdot wd+wn)\,v3)\,z)////(q\cdot k\cdot wd),\ \text{and}$$

(u(x+w, y+w), v(x+w, y+w)) which are the horizontal and vertical components of the motion vector of a pixel at the coordinates (x+w, y+w) multiplied by m, are found by calculating:

$$u(x+w,\ y+w)=(((p\cdot wd-(x-i)\cdot wd-wn)\,uL(y+w)+((x-i)\cdot wd+wn)\,uR(y+w))m)//(p\cdot z\cdot wd)$$

$$v(x+w,\ y+w)=(((p\cdot wd-(x-i)\cdot wd-wn)\,vL(y+w)+((x-i)\cdot wd+wn)\,vR(y+w))m)//(p\cdot z\cdot wd)$$

(where *//* is a division wherein the computation result is rounded to the nearest integer when the result of an ordinary division is not an integer, and the order of priority is equivalent to multiplication and division).

Claim 56 (canceled).

57. (previously presented) A method of synthesizing an interframe predicted image according to Claim 53, wherein the absolute value of p is the α power of 2 (where α is a non-negative integer).

58. (previously presented) A method of synthesizing an interframe predicted image according to Claim 54, wherein the absolute value of q is the β power of 2 (where β is a non-negative integer).

59. (previously presented) A method of synthesizing an interframe predicted image according to Claim 53, wherein the absolute values of p and q are respectively the α power of 2 and β power of 2 (where α , β are non-negative integers).

60. (previously presented) A method of synthesizing an interframe predicted image according to Claim 54, wherein the absolute values of p and q are respectively the α power of 2 and β power of 2 (where α, β are non-negative integers).

61. (previously presented) A method of synthesizing an interframe predicted image according to Claim 57, wherein α+hz is a positive integral multiple of 8, and w is 0.

62. (previously presented) A method of synthesizing an interframe predicted image according to Claim 58, wherein β+hz is a positive integral multiple of 8, and w is 0.

63. (previously presented) A method of synthesizing an interframe predicted image according to Claim 57, wherein $\alpha+hz+hw$ is a positive integral multiple of 8, and $w>0$.

64. (previously presented) A method of synthesizing an interframe predicted image according to Claim 58, wherein $\beta+hz+hw$ is a positive integral multiple of 8, and $w>0$.

65. (previously presented) A method of synthesizing an interframe predicted image according to Claim 61, wherein the value of hz is varied according to the value of α so that $\alpha+hz$ is 16 or less for plural different values of α.

66. (previously presented) A method of synthesizing an interframe predicted image according to Claim 62, wherein the value of hz is varied according to the value of β so that $\beta+hz$ is 16 or less for plural different values of β.

67. (previously presented) A method of synthesizing an interframe predicted image according to Claim 63, wherein the value of hz is varied according to the value of α so that $\alpha+hz+hw$ is 16 or less for plural different values of α.

68. (previously presented) A method of synthesizing an interframe predicted image according to Claim 64, wherein the value of hz is varied according to the value of β so that β+hz+hw is 16 or less for plural different values of β.

69. (previously presented) A method of synthesizing an interframe predicted image according to Claim 53, wherein $z \geq m$.

70. (previously presented) A method of synthesizing an interframe predicted image according to Claim 53, wherein $k \geq z$.

71. (previously presented) A method of synthesizing an interframe predicted image according to Claim 53, wherein the absolute values of p and q are respectively different from the number of horizontal and vertical pixels in the interframe predicted image.

72. (previously presented) A method of synthesizing an interframe predicted image according to Claim 53, wherein, when r is the number of pixels in the horizontal direction and s is the number of pixels in the vertical direction of the interframe predicted image (where r, s are positive integers), 1/2 of the absolute value of p is less than r, the absolute value of p is equal to or greater than r, 1/2 of the absolute value of q is less than s, and the absolute value of q is equal to or greater than s.

73. (previously presented) A method of synthesizing an interframe predicted image according to Claim 53, wherein, when r is the number of pixels in the horizontal direction and s is the number of pixels in the vertical direction of the interframe predicted image (where r, s are positive integers), the absolute value of p is equal to or less than r, twice the absolute value of p is larger than r, the absolute value of q is equal to or less than s, and twice the absolute value of q is larger than s.

74. (previously presented) A method of synthesizing an interframe predicted images according to Claim 53, wherein,

when the number of pixels in the horizontal and vertical directions of the interframe predicted image is respectively r and s (wherein r and s are positive integers), and the pixels of the interframe predicted image lie in a range wherein the horizontal coordinate is from 0 to less than r and the vertical coordinate is from 0 to less than s, (u0, v0), (u1, v1), (u2, v2), (u3, v3) which is expressed by

$$u'(x, y)=(((s\cdot cd-cn-y\cdot cd)((r\cdot cd-cn-x\cdot cd)u00 + (x\cdot cd+cn)u01 +$$

$$(y\cdot cd+cn)((r\cdot cd-cn-x\cdot cd)u02+(x\cdot cd-cn)u03))k)///(r\cdot s\cdot n\cdot cd^2),$$

$$v'(x, y)=(((s\cdot cd-cn-y\cdot cd)((r\cdot cd-cn-x\cdot cd)v00 +(x\cdot cd+cn)v01)+$$

$$(y\cdot cd+cn)((r\cdot cd-cn-x\cdot cd)v02+(x\cdot cd+cn)v03))k)///(r\cdot s\cdot n\cdot cd^2),$$

$$u0=u'(i, j)$$

$$v0=v'(i, j)$$

$$u1=u'(i+p, j)$$

$$v1=v'(i+p,j)$$

$$u2=u'(i, j+q)$$

v2=v' (i,j+q)

u3=u' (i+p, j+q)

v3=v' (i+p,j+q)

(where /// is a division wherein the computation result is rounded to the nearest integer when the result of an ordinary division is not an integer, and the order of priority is equivalent to multiplication and division), are used as the k times horizontal and vertical components of motion vectors of representative points (i,j), (j+p, j), (i, j+q), (i+p, j+q), by using (u00, v00), (u01, v01), (u02, v02), (u03, v03) (where u00, v00, u01, v01, u02, v02, u03, v03 are integers), which are n times (where n is a positive integer) motion vectors at the corners of said interframe predicted image situated at coordinates (-c, -c), (r-c, -c), (-c, s-c), (r-c, s-c) (where c=cn/cd, cn is a non-negative integer, cd is a positive integer and cn<cd), whereof the horizontal and vertical components take the values of integral multiples of 1/n.

75. (previously presented) An image encoding method using a method of synthesizing an interframe predicted image comprising:

a sixth step for synthesizing the interframe predicted image according to claim 53, by performing motion compensation using said reference which is a decoded image of a previously encoded frame and an input image of current frame;

a seventh step for generating a differential image between said interframe predicted image and said input image of said current frame;

a eighth step for transforming said differential image to obtain a transformed signal which is then encoded,

a ninth step for applying an inverse transformation to said transformed signal to produce a decoded differential image and

a tenth step for generating a decoded image of said current frame by adding said decoded differential image and said interframe predicted image.

76. (previously presented) An image encoding method using a method of synthesizing an interframe predicted image comprising:

a sixth step for synthesizing the interframe predicted image according to claim 74, by performing motion compensation using said reference image which is a decoded image of a previously encoded frame and an input image of current frame;

a seventh step for generating a differential image between said interframe predicted image and said input image of said current frame;

a eighth step for transforming said differential image to obtain a transformed signal which is then encoded;

a ninth step for inverse transforming said transformed signal to obtain a decoded differential image, and

a tenth step for synthesizing a decoded image of a current frame by adding said decoded differential image and said interframe predicted image.

77. (previously presented) An image decoding method using a method of synthesizing an interframe predicted image, comprising:

a sixth step for inputting an interframe coding signal of an image frame which is to be decoded and motion vector information concerning said image frame,

a seventh step for applying an inverse transformation to said interframe coding signal into a decoded differential signal,

a eighth step for producing an interframe predicted image according to claim 53, from the reference image which is a decoded image signal of another image frame different in time from said image frame to be decoded and said motion vector information; and

a ninth step for adding the decoded differential signal and said interframe predicted image to obtain a decoded image signal of said image frame which is to be decoded.

78. (previously presented) An image encoding method according to claim 75, wherein the absolute value of p is the α power of 2 (where α is a non-negative integer).

79. (previously presented) An image encoding method according to claim 75, wherein the absolute value of p and q are the α power of 2 and β power of 2 (where α and β are non-negative integers).

80. (previously presented) An image encoding method according to claim 75, wherein said sixth step comprises a step for extracting and encoding information relating to said motion vectors at the representative points of said interframe predicted image.

81. (previously presented) An image decoding method according to claim 77, wherein the absolute value of p is the α power of 2 (where α is a non-negative integer).

82. (previously presented) An image decoding method according to claim 77, wherein the absolute value of p and q are the α power of 2 and β power of 2 (where α and β are non-negative integers).

83. (previously presented) An image decoding method according to claim 77, wherein said motion vector information includes said motion vectors at the representative points of said interframe predicted image.

84. (previously presented) An image decoding method according to claim 77, wherein said motion vector information includes said motion vectors at the corners of said interframe predicted image.